



## SEMESTER-II

### BTC DSM 151T CELL BIOLOGY AND BIOCHEMISTRY

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

*Course Objective: The objective of the course in Cell Biology and Biochemistry is to provide students with a comprehensive understanding of the principles and concepts related to the structure, function, and behavior of cells, as well as the fundamental aspects of biochemistry. The course aims to introduce students to the organization and components of cells, including organelles and cell membranes. It also covers essential topics in biochemistry, such as nucleic acids, proteins, carbohydrates, enzymes, and metabolic pathways.*

#### UNIT 1

(8 Lectures)

**Introduction to cell biology:** cell theory; ultrastructure of prokaryotic and eukaryotic cells. **Cell Membrane:** components of biological membranes, fluid mosaic model; cell recognition and membrane transport.

#### UNIT 2

(8 Lectures)

**Structure and function of cell organelles:** cytosol; endoplasmic reticulum; golgi complex; mitochondria; chloroplast; ribosomes; lysosomes; peroxisomes; nucleus; nucleolus; vacuole; cytoskeleton.

#### UNIT 3

(10 Lectures)

**Nucleic acids:** nucleosides and nucleotides; purines and pyrimidines; physical and chemical properties of nucleic acids; double helical model of DNA. **Cell cycle:** regulation of cell cycle; mitosis and meiosis; cell cycle check point; programmed cell death. **Cancer:** carcinogenesis; agents promoting carcinogenesis; oncogenes; characteristics and molecular basis of cancer; treatment and prevention of cancer.

#### UNIT 4

(10 Lectures)

**Amino acids and proteins:** structure and properties of amino acids; different level of structural organization of proteins; physical and chemical properties of proteins; forces stabilizing protein structure. **Carbohydrate:** structure; properties and function of monosaccharides, disaccharides and polysaccharides.

#### UNIT 5

(9 Lectures)

**Enzymes:** nomenclature and classification of enzymes; factors affecting enzyme activity; activation energy; enzyme inhibition- reversible and irreversible; cofactors; prosthetic groups. **Carbohydrate metabolism:** glycolysis; TCA cycle; electron transport chain.

**Course Outcomes:** *By the end of the course, students will have a comprehensive understanding of cell biology, including the ultrastructure of prokaryotic and eukaryotic cells, as well as the components of biological membranes and the structure and function of cell organelles. They will also acquire an understanding on nucleic acids, cell cycle and cancer. Additionally, students will be familiar with the structure, properties, and functions of proteins and carbohydrates. They will have a solid understanding of the major metabolic pathways involved in carbohydrate metabolism, including glycolysis, the TCA cycle, and the electron transport chain.*

### **SUGGESTED READING**

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
6. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
7. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, W.H Freeman and Company, New York, USA.